PreAssessment Quadratic Unit

Multiple Choice
Identify the choice that best completes the statement or answers the question.

___ 1 Identify the vertex of the graph. Tell whether it is a minimum or maximum.

\[ \text{A} \ (0, 0); \text{ maximum} \]
\[ \text{B} \ (0, 1); \text{ maximum} \]
\[ \text{C} \ (0, 1); \text{ minimum} \]
\[ \text{D} \ (0, 0); \text{ minimum} \]

___ 2 Which of the quadratic functions has the narrowest graph?

\[ \text{A} \ y = -3x^2 \]
\[ \text{B} \ y = \frac{1}{7}x^2 \]
\[ \text{C} \ y = \frac{1}{3}x^2 \]
\[ \text{D} \ y = -4x^2 \]
3 If an object is dropped from a height of 39 feet, the function \( h(t) = -16t^2 + 39 \) gives the height of the object after \( t \) seconds. Graph the function.

A

B

C

D

4 Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of
\[ y = 4x^2 + 5x - 1 \]

A \( x = \frac{5}{8} \); vertex: \( \left( \frac{5}{8}, \frac{45}{8} \right) \)

B \( x = \frac{5}{8} \); vertex: \( \left( \frac{5}{8}, \frac{3}{16} \right) \)

C \( x = -\frac{5}{8} \); vertex: \( \left( -\frac{5}{8}, -\frac{11}{16} \right) \)

D \( x = -\frac{5}{8} \); vertex: \( \left( -\frac{5}{8}, -2\frac{9}{16} \right) \)
Graph $f(x) = 2x^2 + 2x - 2$. Label the axis of symmetry and vertex.

A

Axis of symmetry: $x = 0.5$
Vertex: $(0.5, -2.5)$

B

Axis of symmetry: $x = -0.5$
Vertex: $(-0.5, 2.5)$

C

Axis of symmetry: $x = -0.5$
Vertex: $(-0.5, 2.5)$

D

Axis of symmetry: $x = -0.5$
Vertex: $(-0.5, -2.5)$
6 Suppose you have 56 feet of fencing to enclose a rectangular dog pen. The function \( A = 28x - x^2 \), where \( x \) = width, gives you the area of the dog pen in square feet. What width gives you the maximum area? What is the maximum area? Round to the nearest tenth as necessary.

A width = 28 ft; area = 196 ft
B width = 28 ft; area = 420 ft
C width = 14 ft; area = 588 ft
D width = 14 ft; area = 196 ft

7 A ball is thrown into the air with an upward velocity of 48 ft/s. Its height \( h \) in feet after \( t \) seconds is given by the function \( h = -16t^2 + 48t + 8 \). In how many seconds does the ball reach its maximum height? Round to the nearest hundredth if necessary. What is the ball’s maximum height?

A 1.5 s; 44 ft  B 3 s; 8 ft  C 1.5 s; 116 ft  D 1.5 s; 56 ft
8  Solve $x^2 + 2 = 6$ by graphing the related function.

A

There are two solutions: 2 and -2.

B

There are two solutions: $\pm \sqrt{8}$.

C

There are two solutions: 2 and -2.

D

There are no real number solutions.
Solve the following equations using square roots.

9  \( x^2 - 15 = 34 \)

- A  \( \pm 7 \)
- B  \( 7 \)
- C  no real number solutions
- D  \( \pm 49 \)

10  \( x^2 + 20 = 4 \)

- A  \( \sqrt{24} \)
- B  \( -4 \)
- C  \( \pm \sqrt{24} \)
- D  no real number solutions

11 Solve \((x-8)(4x+2)=0\) using the Zero Product Property.

- A  \( x = -8 \) or \( x = -\frac{1}{2} \)
- B  \( x = 8 \) or \( x = -\frac{1}{2} \)
- C  \( x = -8 \) or \( x = \frac{1}{2} \)
- D  \( x = 8 \) or \( x = \frac{1}{2} \)

Solve the following equations by factoring.

12  \( z^2 - 4z - 12 = 0 \)

- A  \( z = -6 \) or \( z = 2 \)
- B  \( z = -6 \) or \( z = -2 \)
- C  \( z = 6 \) or \( z = -2 \)
- D  \( z = 6 \) or \( z = 2 \)

13  \( 3z^2 + 17z + 20 = 0 \)

- A  \( z = -5 \) or \( z = 4 \)
- B  \( z = -\frac{17}{3} \) or \( z = -4 \)
- C  \( z = -5 \) or \( z = -4 \)
- D  \( z = -\frac{17}{3} \) or \( z = 4 \)
14. $c^2 - 7c = 0$

A. $c = 1$ or $c = -\sqrt{7}$  
B. $c = 0$ or $c = -7$  
C. $c = 0$ or $c = 7$  
D. $c = 0$ or $c = \sqrt{7}$

15. The expression $ax^2 - bx = 0$ has the solution $x = 0$.  

A. always  
B. sometimes  
C. never

Solve the following equations by completing the square.

16. $x^2 - 6x = -15$

A. $-3 \pm 2i\sqrt{6}$  
B. $3 \pm \sqrt{6}$  
C. $-3 \pm 2\sqrt{6}$  
D. $3\pm i\sqrt{6}$

17. $x^2 + 2x - 6 = 0$

A. 2.24, 2.65  
B. -8, 6  
C. 1.65, -3.65  
D. 1.65, -3.65

Use the Quadratic Formula to solve the following equations.

18. $2a^2 - 46a + 252 = 0$

A. 18, 28  
B. -9, -14  
C. 9, 14  
D. -18, 28

19. $x^2 + 6x + 18 = 0$

A. 0, -6  
B. $-3 \pm 3\sqrt{3}$  
C. no solution  
D. $-3 \pm 3i$
20. A rocket is launched from atop a 56-foot cliff with an initial velocity of 135 ft/s. Substitute the values into the vertical motion formula $h = -16t^2 + vt + c$. Let $h = 0$. Use the quadratic formula to find out how long the rocket will take to hit the ground after it is launched. Round to the nearest tenth of a second.

- A  $0 = -16t^2 + 135t + 56; 0.4 \text{ s}$
- B  $0 = -16t^2 + 56t + 135; 0.4 \text{ s}$
- C  $0 = -16t^2 + 135t + 56; 8.8 \text{ s}$
- D  $0 = -16t^2 + 56t + 135; 8.8 \text{ s}$

21. For which discriminant is the graph possible?

- A  $b^2 - 4ac = -9$
- B  $b^2 - 4ac = 0$
- C  $b^2 - 4ac = 4$

Find the number of real solutions for the following equations.

22. $x^2 - 12x + 36 = 0$

- A  0
- B  2
- C  1

23. $x^2 - 5 = 0$

- A  0
- B  2
- C  1
Use the following functions to answer the next set of questions: $f(x) = 3x - 2$, $g(x) = 3x^2 + 2x - 1$, $h(x) = 4x + 8$ and $k(x) = 2x^2 - x - 9$.

24. Find $\frac{f}{h}(2)$.

\[ \begin{array}{ll}
A & 4 \\
B & \frac{1}{4} \\
C & 2 \\
D & \frac{1}{2}
\end{array} \]

25. Find $f(x) \cdot h(x)$.

\[ \begin{array}{ll}
A & 12x^2 + 16x - 16 \\
B & 12x^2 - 16 \\
C & 12x^2 + 32x - 16 \\
D & 12x^2 + 32x + 16
\end{array} \]

26. Find $g(x) + k(x)$.

\[ \begin{array}{ll}
A & -5x^2 - x + 10 \\
B & -x^2 - 3x - 8 \\
C & 5x^2 + x - 10 \\
D & x^2 + 3x + 8
\end{array} \]

27. Find $(g - k)(3)$.

\[ \begin{array}{ll}
A & 24 \\
B & 86 \\
C & 38 \\
D & 26
\end{array} \]
28 Find the inverse of the function: \( f(x) = x^2 - 4 \). Is the inverse a function?

A \( f^{-1}(x) = x^2 + 4 \); yes it is a function.
B \( f^{-1}(x) = \pm \sqrt{x + 4} \); yes it is a function.
C \( f^{-1}(x) = \pm \sqrt{x + 4} \); no it is not a function.
D \( f^{-1}(x) = x^2 + 4 \); no it is not a function.

29 Find the inverse of the function: \( f(x) = (x - 2)^2 + 3 \). State the domain and range of the inverse.

A \( f^{-1}(x) = \pm \sqrt{x - 3} + 2 \)
   Domain: \( \{ x | x \in \mathbb{R} \} \)
   Range: \( \{ y | y \geq 3 \} \)
B \( f^{-1}(x) = \pm \sqrt{x - 3} + 2 \)
   Domain: \( \{ x | x \geq 3 \} \)
   Range: \( \{ y | y \in \mathbb{R} \} \)
C \( f^{-1}(x) = \pm \sqrt{x + 3} - 2 \)
   Domain: \( \{ x | x \in \mathbb{R} \} \)
   Range: \( \{ y | y \geq 3 \} \)
D \( f^{-1}(x) = \pm \sqrt{x + 3} - 2 \)
   Domain: \( \{ x | x \geq 3 \} \)
   Range: \( \{ y | y \in \mathbb{R} \} \)

30 What transformation of the parent function, \( f(x) = x^2 \), is the function \( f(x) = -(x + 2)^2 \)?

A Reflect across the x-axis and translate right 2.
B Reflect across the y-axis and translate up 2.
C Reflect across the x-axis and translate left 2.
D Reflect across the y-axis and translate down 2.

31 Write a function that represents the parent function, \( y = x^2 \), after it has been translated 3 up and 2 right.

A \( y = (x - 3)^2 + 2 \)
B \( y = (x - 2)^2 + 3 \)
C \( y = (x + 3)^2 - 2 \)
D \( y = (x + 2)^2 - 3 \)
32. What function models the graph below?

A. \( y = (x+4)^2 + 2 \)
B. \( y = (x+2)^2 + 4 \)
C. \( y = (x-4)^2 + 2 \)
D. \( y = (x-4)^2 - 2 \)

33. Use the second difference to determine which equation models the table below:

<table>
<thead>
<tr>
<th>x</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>28</td>
<td>12</td>
<td>0</td>
<td>-8</td>
<td>-12</td>
<td>-12</td>
<td>-8</td>
<td>0</td>
</tr>
</tbody>
</table>

A. \( f(x) = (x-4)(x+1) \)
B. \( f(x) = 4(x-4)(x+1) \)
C. \( f(x) = 2(x+4)(x-1) \)
D. \( f(x) = 2(x-4)(x+1) \)
34 Convert \( y = x^2 + 4x - 7 \) to vertex form, identify the vertex and the graph.

A \( y = (x+4)^2 - 7; \) vertex (-4, -7)

B \( y = (x+2)^2 - 7; \) vertex (-2, -7)

C \( y = (x+2)^2 - 11; \) vertex (-2, -11)

D \( y = (x+2)^2 + 11; \) vertex (-2, 11)
35 Convert $y = x^2 + 5x - 6$ to factored form, identify the x-intercepts and the graph.

A $y = (x + 3)(x + 2)$; x-ints (0, -3)(0, -2)

B $y = (x + 6)(x - 1)$; x-ints (0, -6)(0, 1)

C $y = (x - 3)(x - 2)$; x-ints (0, 3)(0, 2)

D $y = (x - 6)(x + 1)$; x-ints (0, 6)(0, -1)